



A MAJOR INTERDISCIPLINARY RESEARCH  
PROJECT TO ENHANCE THE UK'S FOOD  
SECURITY IN A CHANGING WORLD



# OPTIMISING THE RESILIENCE OF THE UK'S FOOD SYSTEM TO ENVIRONMENTAL, BIOLOGICAL, ECONOMIC, SOCIAL AND GEOPOLITICAL SHOCKS

The 'Resilience of the UK Food System in a Global Context' (GFS-FSR) is a major five-year programme, launched in 2016 by the Global Food Security Programme (GFS), the UK's cross government programme on food security research.

## The research addresses three themes:



Optimising the productivity, resilience and sustainability of agricultural systems and landscapes



Optimising the resilience of food supply chains



Influencing food choice at individual and household level to both improve health and enhance food systems resilience

The programme aims to help policymakers and practitioners improve the understanding of where the major vulnerabilities of the UK food system lie and how its resilience to environmental, biological, economic, social and geopolitical shocks can be enhanced.

Across UK universities and institutes, 13 collaborative research projects are producing new evidence and recommendations for policy and practice. These will help create a more efficient and resilient UK food system in a rapidly changing world. The results will help to identify and develop interventions to strengthen UK food security.

## Why does the UK food system need to be resilient?

The UK imports around half of its food and our diets are highly varied, demanding a wide range of foodstuffs to be available all year round. Environmental, biological, economic, social and geopolitical stresses interact to make the UK food system vulnerable to disruption. For example, extreme weather (an important aspect of climate change), changes in trade arrangements and currency fluctuations all affect food availability. The effects of these food system 'drivers' (especially powerful when they occur together), lead to volatility in food supply and affordability – and hence food security. We therefore need to enhance our food system's resilience to such shocks and stresses.

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# SHAPING POLICY AND PRACTICE

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LAUNCHED  
**2016**

TOTAL FUNDING  
**£14.5 million**

THREE OVERALL THEMES



PRODUCTION



SUPPLY CHAINS



CONSUMPTION

DURATION

**5**  
YEARS

**13**

COLLABORATIVE  
PROJECTS

FUNDED BY

BBSRC, ESRC, NERC and  
Scottish Government

## Securing the future of the nation's favourite fruit

### BananEx

More than five billion bananas purchased in Britain each year, however one single variety – Cavendish – is traded internationally. A new virulent strain of Panama Disease known as Tropical Race 4 is emerging from Asia to threaten Cavendish. With no alternative tradable varieties available, and no chemical disease controls, supply is extremely vulnerable. This interdisciplinary research programme is investigating the resilience of banana production and supply from biological, ecological, economic and social perspectives to safeguard the supply of this important fruit.

 [bananex.org](http://bananex.org)



[foodsecurity.ac.uk/research](http://foodsecurity.ac.uk/research)

## Evaluating the potential of multi-trophic aquaculture to improve nutrition and ecosystem sustainability in the UK

### DiverseaFood

This project explores how the diversification of UK aquaculture and transition to integrated multi-trophic aquaculture (IMTA) can increase the contribution of seafood to a healthy and sustainable diet and lead to environmentally and socio-economically sound production. Using an integrated supply-demand approach, DiverseaFood will evaluate the nutritional contribution, environmental sustainability and socio-economic impact of IMTA. The project will investigate interventions at the levels of business models, regulation and policy, and consumer acceptance of IMTA products. The findings will inform understanding the key barriers to aquaculture diversification.



## *Increasing resilience to water-related risks in the UK fresh fruit and vegetable system*

### **FF&V**

Fresh fruit and vegetables, which are in demand all year round, are often grown in the driest parts of the UK or imported from countries where water resources are under stress, for example Spain, South Africa, Morocco and Peru. This project explores resilience across the value chain to three kinds of risk related to water: its physical availability (which might affect production, so raising prices); reputational risks (when environmental issues are highlighted in the media); and regulatory risks (such as restrictions on irrigation due to drought).

 [cranfield.ac.uk/research-projects/resilience-to-water-related-risks](http://cranfield.ac.uk/research-projects/resilience-to-water-related-risks)



## *Integrating knowledge for food systems resilience*

### **IKnowFood**

Systems of food production, trade and consumption are increasingly vulnerable to interconnected political, economic and ecological shocks associated with climate, environmental and ecosystem changes, shifts in farming practices and consumer lifestyles, and globalisation. This project uses the concept of resilience to investigate the sources of these vulnerabilities and to produce datasets, information resources, engagement approaches and business tools that will assist stakeholders in developing mitigation and adaptation strategies.

 [iknowfood.org](http://iknowfood.org)  
 [@iknowfoodYork](https://twitter.com/iknowfoodYork)



## *Modelling landscapes for resilient pollination services*

### **Resilient Pollinators**

Pollination services by insects, particularly bees and hoverflies, underpin millions of pounds of crop production within the UK. Pollinator populations are under considerable pressure from a number of sources, including climate change, agricultural intensification and habitat loss. This project, involving a team of ecologists, economists and sociologists, explores the impacts of future scenarios on the resilience of pollinator natural capital, identify tipping points in service provision and assessing the feedbacks these have on economic and socio-cultural values.

 [reading.ac.uk/caer/RP/RP\\_index.html](http://reading.ac.uk/caer/RP/RP_index.html)



## *Predicting the impacts of intensification of and future changes to the UK pig industry*

### **PIGSustain**

This project uses a multi-disciplinary, integrated systems approach to model and assess the resilience of the UK pig industry, currently and in the future. The research team will produce models to predict the impacts of intensification, changes in climate, trade, feed prices and demand, on the health, disease and welfare of the animals: how consumption patterns and retail prices are likely to be affected; how these changes will impact farmers; and how these in turn will impact on the health and welfare of the animals.

 [welfare-epicentre.weebly.com](http://welfare-epicentre.weebly.com)  
 [@Pig\\_Sustain](https://twitter.com/Pig_Sustain)



## *The role of phosphorus in the resilience and sustainability of the UK food system*

### **RePhoKUs**

Phosphorus (P) is an essential nutrient required for crop and livestock production however the global reserves of phosphate rock from which fertilisers and feeds are derived are a finite critical resource. UK agriculture is entirely dependent on P imports of fertilisers, feeds and foods, which are becoming increasingly volatile in cost. Phosphorus is also an endemic water pollutant due to inefficiencies across multiple scales in the food chain. This project aims to enhance the resilience and sustainability of the UK food system by developing adaptive strategies that will reduce the vulnerability of UK farming to future P shocks and optimise the provision of ecosystem services linked to water quality.

 [wp.lancs.ac.uk/rephokus](http://wp.lancs.ac.uk/rephokus)  
 [@RePhoKUs](https://twitter.com/RePhoKUs)



## *Socio-technical innovation for dairy resilience and sustainability*

### **Resilient Dairy Landscapes**

The UK has the tenth largest dairy sector in the world. This project explores the trade-offs between farmers' livelihoods, the natural environment and the stable supply of reasonably priced dairy products in order to find better ways of working in the face of unpredictable future societal, environmental and climate change. It integrates the latest social, economic, natural, and veterinary science with the expertise of farmers and the dairy industry to devise and test innovations that will increase the resilience and sustainability of dairy farming in a rapidly changing world.

 [resilientdairylandscapes.com](http://resilientdairylandscapes.com)  
 [@ResilientDairy](https://twitter.com/ResilientDairy)



## Resilience in upland livestock systems

### ResULTS

UK uplands form a substantial element of the UK's agricultural land resource and have an important role to play in addressing many wider environmental issues. Farming and other land uses in the uplands are extremely challenging, financially marginal, and need to respond to challenges such as climate change, livestock diseases and changing societal demands. This project will examine how beef cattle and sheep farmers in upland areas can improve their resilience to environmental, economic, and social change, and what impact their actions to improve resilience will have on food supplies, natural resources and society.

 [upland-resilience.org](http://upland-resilience.org)  
 [@Hill\\_ResULTS](https://twitter.com/Hill_ResULTS)



## Resilience of the UK food system to global shocks

### RUGS

An increasing global population needs more food, fuel and shelter than ever before, with changes in demand shifting production towards commodities that are more land intensive to supply. The interconnected nature of the global food system means local shocks or changes can cause impacts in other regions. To mitigate and adapt to these we need a better understanding of where food supply chains are vulnerable and where they show resilience. This project examines how the global food system deals with shocks and changes while the research aims will develop our understanding of the impact that these events have on the UK food system.

 [rugs-project.uk](http://rugs-project.uk)



*Can ruralising urban areas through greening and growing create a healthy, sustainable and resilient food system?*

## Rurban Revolution

Our food system is facing multiple major challenges: with a growing obesity crisis; inequality in access to nutritious food; a dwindling land resource for supporting farming; ecosystem degradation from agricultural land use change and practice; and questionable supply resilience in the face of political instability. This project seeks to examine how the ruralisation of our urban areas – what we're calling 'rurbanisation' – by increasing greening and food growing in urban areas could help tackle these challenges, by: increasing availability, access and preferences for fruit and vegetables; by alleviating pressures on land use and environment and enhancing urban ecosystems; and shortening supply chains.

 [wp.lancs.ac.uk/rurbanrevolution](http://wp.lancs.ac.uk/rurbanrevolution)

 @RurbanRev



*Sustainable economic and ecological grazing systems – learning from innovative practitioners*

## SEEGSLIP

Grassland systems, which dominate the UK agricultural landscape, are largely economically unproductive, ecologically degraded, dominated by a single grass species, organic carbon poor and heavily reliant on inputs to maintain the productivity of both grass and associated livestock. Pasture for Life (PfL) certified producers feed grass only and have adopted pasture management practices that mimic natural systems using approaches which can potentially extend the grazing season while providing environmental, economic and livestock benefits in terms of health and productivity. This project will holistically evaluate the ecological, agronomic and social impacts of the pasture fed livestock approach to grazing management and its potential.

 @seegslip



*Transforming and growing relationships within regional food systems for improved nutrition and sustainability*

## **T-Grains**

T-GRAINS combines a place-based approach with agricultural modelling to assess whether sustainable and nutritious diets that are socially, culturally and economically desirable can be produced within regional landscapes. The research team works with producers, consumers and retailers to understand the impact that direct relationships between actors has on the flow of information, the building of trust, and food purchasing and consumption. This project seeks to understand how technology can catalyse these relationships to deliver healthier and environmentally sustainable diets.



THE UK  
IMPORTS  
AROUND  
50% OF THE  
TOTAL FOOD  
CONSUMED  
AND THE  
PROPORTION  
IS RISING

(source: Defra)

The GFS-FSR programme is coordinated by a team within the Food Systems Group at the Environmental Change Institute, University of Oxford. Working closely with the 13 projects, the team integrates research activities and findings into the programme and develops outreach and engagement with stakeholders across the food sector.

## Programme Coordination Team

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## Have your say

We aim to help shape our food system into one that’s resilient to shocks and stresses. If you want to join the conversation, please get in touch with the Programme Coordination Team.



**[foodsecurity.ac.uk/research](https://foodsecurity.ac.uk/research)**



**[@FSR\\_ProgrammeUK](https://twitter.com/FSR_ProgrammeUK)**





**THE 'RESILIENCE OF THE UK FOOD SYSTEM IN A GLOBAL CONTEXT' (GFS-FSR) IS A MAJOR FIVE-YEAR PROGRAMME, LAUNCHED IN 2016 BY THE GLOBAL FOOD SECURITY PROGRAMME (GFS), THE UK'S CROSS-GOVERNMENT PROGRAMME ON FOOD SECURITY RESEARCH.**



Scottish Government  
Riaghaltas na h-Alba  
gov.scot